3. How to determine the chip is working properly

If you hit a pair of chips can not normally receive, should first of all with the normal-chip transceiver to determine which chip is a problem, and determine a transmitter or receiver not bad, in this context, will be detailed out in the transmitting or receiving After the failure analysis process issues. Voltage value of each state failure process analysis table and send drawings, see the back part of the chart below notes the detailed explanation. In reference to flowchart debugging, where there is an infinite loop, considering the chip is damaged or bad welding.

(1) Check the software: whether the reference code in particular the reference register value are different; with normal board to check the MCU is correctly written all the registers; BK2421 sending and receiving time, whether to switch to the correct mode, letting the former Are there delay; for the convenience of debugging, it is recommended to send NoACK package, then REUSE command to stop sending packets. See reference document reference code [3].

(2) Check the RF matching circuit and antenna: the reference circuit and the antenna is exactly the same circuit, including component values, PCB layout and antenna size. If the circuit output power of the different needs of conduction testing, test methods, see emission power frequency test, such as not to match the value of 0dBm debug circuitry is required, required if the antenna of different vector network analyzer test or substitution antenna characteristics of the antenna excluded. Note whether the component values when welding circuit, the chip PIN feet VDDPA, RFP, RFN is a short to ground.

(3) ISM band has no interference: testing ISM band (2400MHz ~ 2483.5MHz) has no interference with the most direct method is to 2.4G antenna connected to the spectrum analyzer, measure space radiation directly to the signal, set the spectrum analyzer Span = 2300MHz ~ 2500MHz , Ref Amplitude <-50dBm. If there is no spectrum analyzer, the easiest way is to switch the channel to re-test, this time a little out of ISM band optional, but can still work BK2421 frequency, such as the Channel = 90 (2490MHz).

(4) transmitting a single carrier CW (Continuous Wave): test methods, see emission power frequency test.

(5) CW frequency offset <100KHz: CW frequency offset value means the measured value and theoretical value of the frequency deviation between the theoretical value represents the channel when the frequency of N (2400 N) MHz, the test frequency Span <10MHz.

(6) adjusting the crystal frequency offset or change the crystal: first calculation based on the crystal load capacitance CL crystal capacitance value C1 = C2 = 2 × CL-Cp, Cp for the chip and the PCB parasitic capacitance on, BK2421 is 2 ~ 3pF; if in accordance with the theoretical value is greater than 100KHz offset, then it need to change the C1, C2 values (larger C1, C2 would have to change the value of firing frequency is low, but it is fine-tuning C1, C2 is coarse); If after adjusting the value of finished consistency is poor, you need to replace the crystal, improving the precision crystal ppm.

*(7) Power is clean: i*f a single carrier in the spectrum is relatively dirty, most likely due to power supply interference, can be directly measured oscilloscope power 3.3V, the oscilloscope is set to AC Coupled, if Vpp peak power supply noise is greater than 20mV, that power is dirty, and need to use RC filter circuit, 10 ohms in series, parallel large capacitor to ground, see the reference schematic. If the power is not easy to filter clean, a clean power source can be replaced by an external input to see whether work.

(8) SPI read and write properly determine whether or not: the first to write Bank0 in to R / W register, then read out, as if writing and reading instructions SPI read and write properly, if not the same, in accordance with the following steps to check :
1) The register read and write waveforms with an oscilloscope to see: Check SPI four line level is correct, whether the wave theory of waveform, and the same reference code;
2) function SPI_RW and initialize the array in some MCU platform, compiled, there will be an exception. Step tracking code to see whether the same theory;
3) MISO should be configured as input mode, MISO in need of some MCU in the pull-up resistor, the oscilloscope can be used to see whether the MCU level input requirements;
4) Check the MCU's SPI initialization configuration.

(9) CW lock: lock needed to determine whether CW observed spectrum analyzer, set the spectrum analyzer Span <1MHz, frequency of the desired frequency, if the single frequency remained at a frequency that will not lock to beat live.

(10) to check the crystal is working: Since the default setting in the state, the crystal 20ms after power is automatically turned off, so to test the crystal is working to re-power, less than 20ms in the power of the crystal or PIN feet XTALP XTALN test, if the crystal oscillator signal that normal, or it may damage the crystal.

(11) sensitivity testing: see receiver sensitivity test sensitivity test, if no vector signal generator, packet error rate is replaced with a transceiver, or only concerned with transmitting power can also be indirectly measured by the size of reception.

(12) View receiver local oscillator frequency offset <100KHz: receiver local oscillator (RX LO) frequency offset value means the measured frequency and frequency deviation between the theoretical value, here for the purpose of receiving the local oscillator is equivalent to (5), is whether the deviation is too large to see the chip, so it can work in the launch state of the chip used (5) judgments. Such as the need to check with the receiving mode for receiving the oscillator, the specific steps described in the receiver sensitivity test (3) steps, the theory of receiver local oscillator frequency is:
Frxlo = (2400 N-Fspace) * 16/15MHz; where N is channel number, Fspace = 1MHz (1Mbps) or 2MHz (2Mbps).

(13) to receive the local oscillator locked: to determine whether to receive the LO observed locks need to use the spectrum analyzer, set the spectrum analyzer Span <1MHz, Ref Amplitude =- 50dBm, frequency (12) for calculating the frequency, if this has been stuck in a single frequency will not beat a frequency locked to that live.